Section 10 – Maintenance Specifications

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General Engine Data

NOTE: The following engine and system specification data is extracted from the curves and data sheets that were current when this document was prepared. Refer to Performance Curve Drawing 9744 and Data Sheet Drawing 9745 for the most current information. Contact Cummins Fire Power at 920-337-9750 if current information is required.

Refer to the base engine troubleshooting and repair manual for base engine coverage (see Service Literature in Section 8).

Model	Cummins Engine Co. Base Engine	Cummins Base Engine Fuel Rating
CFP83-F10	6CTA8.3G2	FR90242 / FR90243
CFP83-F20	6CTA8.3G2	FR90242 / FR90243
CFP83-F30	6CTA8.3G2	FR90242 / FR90243
CFP83-F40	6CTAA8.3G3	FR90940

Model	Installation Drawing	Configuration Number
CFP83-F10	8708 (see Section 13)	D413034GX02
CFP83-F20	8708 (see Section 13)	D413034GX02
CFP83-F30	8708 (see Section 13)	D413034GX02
CFP83-F40	8710 (see Section 13)	D413035GX02

Model	Fuel System	Aspiration
CFP83-F10	Bosch - P3000 Direct Injection	Turbocharged, Jacket Water Aftercooled (JWAC)
CFP83-F20	Bosch - P3000 Direct Injection	Turbocharged, Jacket Water Aftercooled (JWAC)
CFP83-F30	Bosch - P3000 Direct Injection	Turbocharged, Jacket Water Aftercooled (JWAC)
CFP83-F40	Bosch - P7100 Inline	Turbocharged, Charge Air Cooled

Type	4 Cycle; In-Line; 6 Cylinder
Firing Order	1-5-3-6-2-4
Rotation, Viewed from the Front of the Engine	Clockwise
Compression Ratio:	16.8:1
Valves per cylinder: Inlet/Exhaust	1 / 1

	Metric	US
Bore	114 mm	4.49 in
Stroke	135 mm	5.32 in
Displacement	8.3 liters	505 $in.^3$
Intake Valve Clearance	0.30 mm	0.012 in
Exhaust Valve Clearance	0.61 mm	0.024 in
Dry Weight	790 kg	1742 lb
Wet Weight	823 kg	1815 lb

Fuel System Specifications

Fuel	Type Number 2 Diesel Only
Recommended primary fuel filter	Fleetguard FS1251

	Metric	US
Minimum supply line size	9.5 mm D.	0.375 in. D.
Minimum drain line size	6.4 mm D.	0.25 in. D.
Maximum fuel line length between supply tank & fuel pump	12 m	40 ft.
Maximum fuel height above C/L crankshaft	2030 mm	80 in.
Maximum restriction @ lift pump-inlet - with clean filter	102 mm Hg	4.0 in. Hg
Maximum restriction @ lift pump-inlet - with dirty filter	203 mm Hg	8.0 in. Hg
Maximum return line restriction - without check valves	254 mm Hg	10.0 in. Hg
Minimum fuel tank vent capability	0.342 m^3/hr	12 ft^3/hr
Maximum fuel temperature @ lift pump inlet	71 ^oC	160 ^oF

Lubricating Oil System Specifications

Recommended lube oil filter	Fleetguard LF9009

	Metric	US
Oil pressure range at rated	276-414 kPa	40-60 PSI
Oil capacity of pan (high - low)	18.9-15.1 litre	20-16 U.S. quarts
Total system capacity	23.8 litre	6.3 U.S. Gal.

Cooling System Specifications

Recommended coolant filter	Fleetguard WF2072

	Metric	US
Maximum raw water working pressure range at heat exchanger	414 kPa	60 PSI
Recommended minimum water supply pipe size to heat exchanger	25.4 mm D.	1.0 in. D.
Recommended minimum water discharge pipe size from heat exchanger	31.7 mm D.	1.25 in. D.
Coolant water capacity (engine side)	22.2 Litre	5.9 U.S. gal.
Modulating thermostat range	82-95 ^oC	180-203 ^oF
Minimum raw water flow with water temperatures to 90 ^oF (32 ^oC)	1.9 litre/s	30 U.S. GPM

Air Intake System Specifications

NOTE: Engine intake air must be filtered to prevent dirt and debris from entering the engine. If intake air piping is damaged or loose, unfiltered air will enter the engine and cause premature wear.

Recommended air cleaner element	(Standard) K&N RU5045 (Optional) Donaldson B105006

	Metric	US
Maximum temperature rise between ambient air and engine air inlet	15 ^{o}C	30 ^{o}F
Maximum inlet restriction with dirty filter	635 mm H_2O	25 in. H_2O

Exhaust System Specifications

	Metric	US
Maximum exhaust back pressure imposed by complete exhaust system	10.2 kPa	40.8 in. H_2O
Exhaust pipe size normally acceptable	102 mm D.	4 in. D.

Electrical System Specifications

Start Circuit

The start circuit consists of a single starter motor and redundant starter control relays as well as using redundant power sources either 12 V or 24 V comprised of 12 V wet type storage batteries (optional at shipment).

The battery, starter and starter solenoid positive terminals are booted with a non-conducting cover or otherwise insulated from unintended grounding. Battery cable leads from the batteries to the designated connection points in the starting circuit are minimum 6.53 mm D. (No. 2 AWG), neoprene or rubber insulated with a 1.5 mm (0.060 in.) minimum insulation thickness rated 80°C (176 ^{o}F) minimum. The starter and starter solenoid are all metal enclosed.

Wiring for automatic starting (negative ground)	Standard
Reference wiring diagram	10423 (see Section 13)
B.C.I. Group Size	8D

	12V	24V
Minimum recommended battery cold cranking amperes (CCA)(1)	1250 Amps	625 Amps
Minimum recommended battery reserve capacity	400 Minutes	800 Minutes
Maximum resistance of starting circuit	0.002 Ohms	0.004 Ohms
Typical cranking speed	120 RPM	120 RPM
Alternator (standard), internally regulated	95 Amps	45 Amps
Battery Cable Size (Metric) (For less than 1.5 meters long)	10.6 mm D.	10.6 mm D.
Battery Cable Size (US) (For less than 5 feet long)	00 AWG	00 AWG

(1) Cold soak at -18 ^{o}C (0 ^{o}F) or above

Cummins/Fleetguard® Filter Specifications

General Information

Fleetguard® is a subsidiary of Cummins Inc. Fleetguard® filters are developed through joint testing at Cummins and Fleetguard®. Fleetguard® filters are standard on new Cummins engines. Cummins Inc. recommends their use.

Fleetguard® products meet all Cummins Source Approval Test standards to provide the quality filtration necessary to achieve the engine's design life. If other brands are substituted, insist on products that the supplier has tested to meet Cummins high-quality standards.

Cummins can not be responsible for problems caused by non-genuine filters that do not meet Cummins performance or durability requirements.

Fuel Recommendations and Specifications

Fuel Recommendations

WARNING

Do not mix gasoline, alcohol, or gasohol with diesel fuel. This mixture can cause an explosion.

CAUTION

Due to the precise tolerances of diesel injection systems, it is extremely important that the fuel be kept clean and free of dirt or water. Dirt or water in the system can cause severe damage to both the fuel pump and the fuel injectors.

Use only number 2 diesel (ASTM no. 2D) fuel.

Any adjustment to compensate for reduced performance with a fuel system using alternate fuel is not warrantable.

Additional information for fuel recommendations and specifications can be found in Fuel for Cummins Engines, Bulletin No. 3379001. See Section 8, Service Literature, for ordering information.

Lubricating Oil Recommendations and Specifications

Oil Performance Recommendations

Using quality engine lubricating oils, along with appropriate oil drain and filter change intervals, is a critical factor in maintaining engine performance and durability. Refer to Service Literature in Section 8 for reference to related Cummins service bulletins.

Cummins Engine Company, Inc. recommends the use of a high-quality SAE 15W-40 heavy-duty engine oil (such as Cummins Premium Blue®), which meets the American Petroleum Institute (API) performance classification CH4/SG.

A sulfated ash limit of 1.0 mass percent is suggested for optimum valve and piston deposit and oil consumption control. The sulfated ash must not exceed 1.85 mass percent.

New Engine Break-In Oils

Do not use special “break-in” lubricating oils for new or rebuilt Cummins engines. Use the same type of oil during the “break-in” as that which is used in normal operation.

Recommended Oil Change Intervals

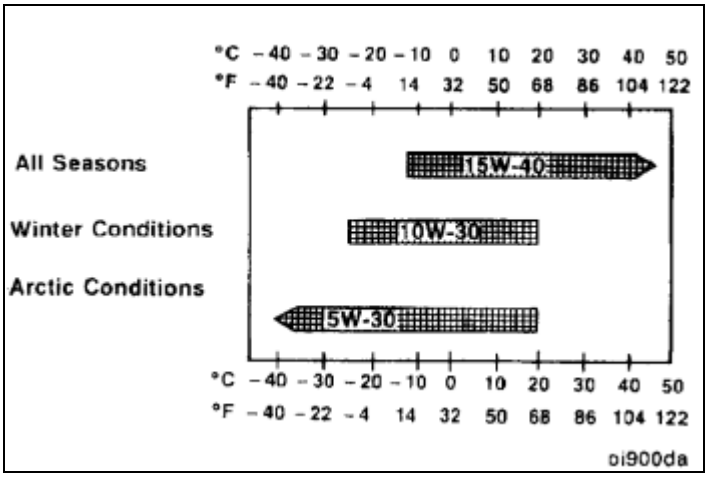
The oil change interval for turbocharged engines is every 6 months or 250 hours.

Oil Viscosity Recommendations

The use of multiviscosity lubricating oil has been found to improve oil consumption control and improve engine cranking in cold temperatures while maintaining lubrication at high operating temperatures.

While 15W-40 oil is recommended for most climates, refer to the accompanying table for oil viscosity recommendations for extreme climates.

NOTE: Limited use of low-viscosity oils, such as 10W-30, can be used for easier starting and providing sufficient oil flow at ambient temperatures below -35°C [23°F]. However, continuous use of low viscosity oils can decrease engine life because of wear. Refer to the accompanying chart.



Coolant Recommendations and Specifications

General Information

Heavy-duty diesel engines require a balanced coolant mixture of water and antifreeze. Drain and replace the mixture every 1 year or 1500 hours of operation (whichever occurs first) to eliminate buildup of harmful chemicals.

Antifreeze is essential in any climate. It broadens the operating temperature range by lowering the coolant freezing point and by raising its boiling point. Do not use more than 50-percent antifreeze in the mixture unless additional freeze protection is required. Never use more than 68-percent antifreeze under any condition.

Use soft water in the coolant mixture. Contaminants in hard water neutralize the corrosion inhibitor components. Water must not exceed 300-ppm hardness or contain more than 100 ppm of either chloride or sulfate.

Specifications

Use low-silicate antifreeze that meets ASTM4985 test (GM6038M spec.) criteria.

Refer to Service Literature in Section 8 for reference to related Cummins service bulletins.

Concentration

Antifreeze must be used in any climate for both freeze and boiling point protection. Cummins recommends a 50-percent concentration level (40-percent to 60-percent range) of ethylene glycol or propylene glycol in most climates. Antifreeze at 68-percent concentration provides the maximum freeze protection and must never be exceeded under any condition. Antifreeze protection decreases above 68 percent.

Ethylene Glycol	Propylene Glycol
40% = -23°C [-10°F]	**40% = -21°C [-6°F]**
50% = -37°C [-34°F]	**50% = -33°C [-27°F]**
60% = -54°C [-65°F]	**60% = -49°C [-56°F]**
68% = -71°C [-90°F]	**68% = -63°C [-82°F]**

Concentration Testing

Antifreeze concentration must be checked using a refractometer (such as Fleetguard® Part No. CC2800). “Floating ball” types of density testers or hydrometers are not accurate enough for use with heavy-duty diesel cooling systems.

Engine Component Torque Values

Torque Table

Component	Wrench Size	N•m	ft-lb	in-lb
Aftercooler mounting	10 mm	24	18	
Aftercooler water hose clamp	8 mm	5		44
Alternator link (Delco 10-15 SI)	13 mm	24	18	
Alternator link (Delco 20-27 SI)	3/4 in	43	32	
Alternator mtg. bolt 10-15 SI	15 mm	43	32	
Alternator mtg. 27 SI	18 mm	77	57	
Alternator support (upper)	10 mm	24	18	
Belt tensioner flat bracket	Allen 5 mm	24	18	
Belt tensioner mounting	15 mm	43	32	
Crankshaft damper and pulley	15 mm	137	101	
Crossover clamp	5/16 in	5		44
Tee bolt type clamp	11 mm	8		71
Exhaust outlet pipe, v-band clamp	7/16 in	8		71
Fuel filter	75 to 85 mm	Install as specified by filter manufacturer.		
Fuel filter adapter nut	24 mm	32	24	
Lubricating oil filter	75 to 85 mm	3/4 of a turn after contact		
Lubricating oil cooler assembly	10 mm	24	18	
Lubricating oil pan drain plug	17 mm	80	59	
Lubricating oil pan heater plug	27 mm	80	59	
Lubricating oil pressure regulator plug	19 mm	80	59	
Starter mounting	10 mm	43	32	
Thermostat housing	10 mm	24	18	
Water inlet connection	15 mm	43	32	
Water pump mounting	13 mm	24	18	
Rocker lever (valve) cover	15 mm	12		106
Water-in-fuel (WIF) sensor	19 mm	Hand-tighten		

Sealants

General Information

Use either the sealants listed below or sealants containing equivalent properties.

Item Description	Sealing Method
Pipe plugs	Pre-coated Teflon™ or pipe sealer
Gaskets	No sealant required
Cups plugs	Loctite 277 or Cummins sealant, Part Number 3375068
O-rings	Lubriplate™ 105
Rear camshaft expansion plug	Loctite 277 or Cummins sealant, Part Number 3375068
Fuel pump studs	Loctite 242
Turbocharger drain (in block)	Loctite 277 or Cummins sealant, Part Number 3375068
Dipstick tube (in block)	Loctite 277 or Cummins sealant, Part Number 3375068
Wet flywheel housing to block	Three-Bond™ sealant, Part Number 3823494
Rear seal (in rear cover)	No sealant required
Timing pin housing capscrews	No sealant required
Side oil fill	Loctite 277 or Cummins sealant, Part Number 3375068
Oil pan at gear housing joint	Three-Bond™ sealant, Part Number 3823494

Capscrew Markings and Torque Values

General Information

CAUTION

When replacing capscrews, always use a capscrew of the same measurement and strength as the capscrew being replaced. Using the wrong capscrews can result in engine damage.

Always use the torque values listed in the following tables when specific torque values are not available.

Do not use the torque values in place of those specified in other sections of this manual.

The torque values in the table are based on the use of lubricated threads.

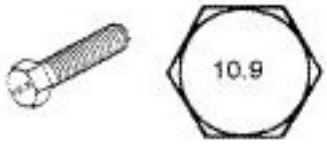
When the ft-lb value is less than 10, convert the ft-lb value to in-lb to obtain a better torque with an in-lb torque wrench. Example: 6 ft-lb equals 72 in-lb.

Metric Capscrew Identification

Sample:	M8-1.25 x 25		
Value:	M8	1.25	X 25
Meaning:	Major thread diameter in millimeters	Distance between threads in millimeters	Length in millimeters

Metric Capscrew Head Markings

Metric capscrews and nuts are identified by the grade number stamped on the head of the capscrew or on the surface of the nuts.

Commercial Steel Class	**8.8**	**10.9**	**12.9**
Capscrew Head Markings			

Metric Capscrew Torque Values

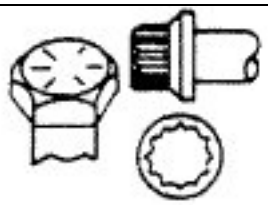
Class:	**8.8**				**10.9**				**12.9**			
Diameter	**Cast Iron**		**Aluminum**		**Cast Iron**		**Aluminum**		**Cast Iron**		**Aluminum**	
mm	**N•m**	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**
6	9	5	7	4	13	10	7	4	14	9	7	4
7	14	9	11	7	18	14	11	7	23	18	11	7
8	23	17	18	14	33	25	18	14	40	29	18	14
10	45	33	30	25	65	50	30	25	70	50	30	25
12	80	60	55	40	115	85	55	40	125	95	55	40
14	125	90	90	65	180	133	90	65	195	145	90	65
16	195	140	140	100	280	200	140	100	290	210	140	100
18	280	200	180	135	390	285	180	135	400	290	180	135
20	400	290	—	—	550	400	—	—	—	—	—	—

US Customary Capscrew Identification

Sample:	5/16 x 18 x 1-1/2		
Value:	5/16	18	1-1/2
Meaning:	Major thread diameter in inches	Number of threads per inch	Length in inches

U.S. Customary Capscrew Head Markings

U.S. Customary capscrews are identified by radial lines stamped on the head of the capscrew.

SAE Grade 5 w/ three lines	**SAE Grade 8**
	

U.S. Customary Capscrew Torque Values

Grade	**SAE Grade 5**				**SAE Grade 8**			
Capscrew Body Size	**Cast Iron**		**Aluminum**		**Cast Iron**		**Aluminum**	
	N•m	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**	**N•m**	**ft-lb**
1/4-20	9	7	8	6	15	11	8	6
1/4-28	12	9	9	7	18	13	9	7
5/16-18	20	15	16	12	30	22	16	12
5/16-24	23	17	19	14	33	24	19	14
3/8-16	40	30	25	20	55	40	25	20
3/8-24	40	30	35	25	60	45	35	25
7/16-14	60	45	45	35	90	65	45	35
7/16-20	65	50	55	40	95	70	55	40
1/2-13	95	70	75	55	130	95	75	55
1/2-20	100	75	80	60	150	110	80	60
9/16-12	135	100	110	80	190	140	110	80
9/16-18	150	110	115	85	210	155	115	85
5/8-11	180	135	150	110	255	190	150	110
5/8-18	210	155	160	120	290	215	160	120
3/4-10	325	240	255	190	460	340	255	190
3/4-16	365	270	285	210	515	380	285	210
7/8-9	490	360	380	280	745	550	380	280
7/8-14	530	390	420	310	825	610	420	310
1-8	720	530	570	420	1100	820	570	420
1-14	800	590	650	480	1200	890	650	480